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DISPOSABLE DIAPER WITH CLOSURE SYSTEM EQUIPPED WITH AT LEAST ONE STRAP AND A MEANS OF RETAINING SAID STRAP AND A METHOD OF MANUFACTURING A LATERAL FASTENING TAB ENTERING INTO SAID CLOSURE SYSTEM

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[Abstract]

For closure of the disposable diaper, either around the waist of the user or after use, after folding the diaper over itself, the disposable diaper consists of at least one strap (38) integral with a first zone of the diaper and at least a means (39) of retaining said strap integral with a second zone of the diaper, the respective placement of the first and second zones being determined to obtain at least partial closure of the diaper (34) when the strap (38) interacts with the corresponding retaining means (39).

The present invention concerns the field of hygiene articles, especially disposable diapers equipped with a fastening system enabling closure around the waist of the wearer and/or a

fastening system enabling closure of the disposable diaper after folding it over itself, when it is to be discarded.

Conventionally, a disposable diaper consists of an impermeable outer sheet, a permeable inner sheet, and an absorbent pad arranged between said two sheets. For positioning of such an article on the user, it also includes a fastening system enabling the back and front parts of the diaper to be fastened to each other once it has been placed around the waist of the user. An adhesive fastening system has been used for a very long time; more specifically, it included two adhesive lateral fastening tabs attached along the edges of the back part of the diaper, and possibly a transverse reinforcement strip on the front part of the diaper. To close the diaper around the waist, it is sufficient to apply each lateral adhesive tab to the front of the frontal part or the transverse reinforcement strip. After use of the diaper, it was possible to fold it over itself so that only the impermeable sheet acting as a barrier to fecal material in contact with the interior permeable sheet appears on the outside. Closure, after this folding and for discarding, is done using the still-available adhesive fastening tabs by applying them to the outer impermeable sheet so as to block the diaper in position in its folded-in state.

Another fastening system has at least in part replaced the adhesive fastening system, namely a mechanical fastening system, of the self-adhesive type, in which hook-type parts interact with loop-type parts. More specifically, such a system is composed of two lateral tabs attached along the edges of the back part of the diaper and provided with hook-type parts as well as at least a frontal strip, provided with loop-type parts, attached to the front part of the impermeable sheet. Diaper closure around the waist of the user is realized in the same way as above, the hooks being linked into the loops so as to lock the lateral tabs and frontal strip together. However, this new self-adhesive fastening system does not normally enable diaper closure when it is folded over itself for disposal. Different solutions have been supplied to remedy this drawback. For example, in EP.O.529 681 [sic; EP 0529681], provision has been made either to integrate an adhesive zone on each lateral fastening tab with self-adhesive part, or to equip the diaper with other lateral adhesive tabs being used only during closure of the diaper after use.

The goal of the applicant is to propose a closure system for disposable diapers that is neither of the adhesive type nor the self-adhesive type, and which could possibly be used with the above-mentioned fastening systems for closure of the disposable diaper either around the waist of the user or after turning the diaper in on itself after use.

This goal is perfectly attained by the disposable diaper of the invention in which the fastening system consists of at least one strap integral with a first zone of the diaper and at least a means of retaining said strap integral with a second zone of the diaper, the respective placement of the first and second zones being determined to obtain at least partial closure of the diaper when the strap interacts with the corresponding retaining means.

In the present text the term strap indicates an elongated part which may be a tape or a strip that is not very wide, a thread, a braid.... As will be seen below, this strap may or may not be elastic.

Concerning closure of the diaper around the waist of the user, the fastening system includes two straps, each ensuring closure of one side of the diaper. Preferably, the two straps are attached, possibly through two lateral tabs, to the two lateral edges of the back part of the diaper, while the retaining means suitable for interacting with said two straps are arranged frontally on the front part of said diaper.

In a preferred embodiment, the disposable diaper includes a frontal strip which is attached, in particular by gluing, only along its central portion on the front part and the retaining means are formed by the two free ends of said strip, not attached to said front part. The advantage of this specific arrangement is to obtain in a single operation attachment of the two retaining means designed to interact with the two straps attached, possibly through two lateral tabs, to the two lateral edges of the back part of the diaper.

Preferably, each retaining means is a section of semi-rigid strip integral with the external sheet of the diaper, said section including at least one, and preferably two transverse notches into which the strap goes to obtain at least partial closure of the diaper.

It may be a single notch when the strap in particular an overthickness abutting the strip section on both sides of the notch. Preferably, there are two transverse notches when the strap is formed in a loop with two anchoring points in the first zone of the diaper. In this case, locking the strap in position on the strip section is done by successively passing the strap into the two notches.

Each notch may be a rectilinear, and preferably an oblique, cut. Both notches may also consist of two recesses cut transversely in the strip section and delimiting a wrapping head, with two projecting transverse portions, for the strap.

The strap may advantageously be elastic.

According to a specific embodiment, the strap is attached by a single anchoring point in the first zone of the diaper, and along its length successively presents a first portion provided with self-adhesive parts with loops, and a second portion with self-adhesive parts with hooks suitable for interacting with the self-adhesive loop part of the first portion.

A preferred embodiment involves an elastic strap, supported by a lateral tab attached to the first zone of the disposable diaper, both ends of the strap being anchored along the two edges opposite the tab such that said strap in its inactive position has a transverse direction with respect to said tab, and is located near the free end of the latter. Under these conditions, the strap occupies only the width of the lateral tab, and is very easily grippable by the user.

Preferably, the end of the lateral tab has a concave cutout between the two anchoring parts of the strap. This arrangement makes grasping the strap by the user even easier.

Another object of the invention is to protect a method of manufacturing a lateral tab as was last described, with width H , having an elastic strap which extends transversely along the end of said tab on both sides of a concave cutout, approximately semicircular, with diameter h . This procedure consists of:

- a) continuously unrolling a tape with width D , made adhesive on a first surface and presenting a succession of approximately circular cutouts aligned along a longitudinal axis Δ of the tape located at a distance d from the first longitudinal edge of the tape,
- b) applying an elastic strap continuously on the first adhesive surface of the tape, aligned with the longitudinal axis Δ
- c) folding the tape along the longitudinal axis Δ while folding down the portion of the tape arranged along the first longitudinal edge onto the adhesive surface,
- d) sectioning the tape by successive transverse cuts according to a spacing H , each transverse cut being made approximately medially between two approximately circular cutouts of the tape.

Preferably, width D of the tape is more than 2 times d , so that after folding, an adhesive lateral portion remains that after sectioning forms an attachment zone for the fastening tab on the lateral back edge of the disposable diaper.

The present invention will be better understood upon reading the description, which will be made with several embodiments of disposable diapers in which the fastening system includes at least one strap in one zone and a means for retaining said strap in another zone, illustrated by the attached drawing in which:

Figure 1 is an oblique view of a first example of a disposable diaper in which the closure is the type with a hook and loop self-adhesive system, and which includes an elastic strap for closure of the diaper on itself after folding over for disposal.

Figure 2 is a front representation of the diaper of Figure 1, closed after use with the help of an elastic strap.

Figure 3 is a schematic plan view of a strip designed to form the two fastening tabs with elastic strap of the diaper of Figure 1.

Figure 4 is a schematic plan view of two fastening tabs with elastic strap according to another embodiment variant.

Figure 5 is a schematic plan view of a strip for manufacturing the fastening tabs of Figure 4.

Figure 6 is an oblique view of a second example of disposable diaper provided with a fastening system with elastic straps and retaining means for closure of the diaper around the waist of the user,

Figures 7 to 10 illustrate the steps of the method of manufacturing a fastening tab with elastic strap according to the embodiment of Figure 6.

Figure 11 is a partial plan view of a single frontal strip in which the two free ends are adapted as a means of retaining elastic straps of lateral fastening tabs according to Figure 6.

According to a first example, the disposable diaper 1 has an hourglass shape with a front part 2 and a back part 3 of greater width than the intermediate part 4 between the legs. It is formed from an external sheet 5, impermeable to liquids, an interior sheet 6 permeable to liquids and to gases, and an absorbing pad 7 which is arranged between said two sheets 5, 6.

Closure of this disposable diaper 1 around the body of the baby is achieved by a mechanical fastening system which is composed on the one hand of two lateral fastening tabs 8 provided with parts 9 of the hook type, and on the other hand of at least one strip 10 provided with parts of the loop type 11. The two fastening tabs 8 are mounted along the edges 12 of the back part 3 of the diaper 1 while the strip 10 provided with loops 11 is mounted on the external sheet 5 of the front part 2 of the diaper 1. To close the diaper 1 on the baby, the front part 2 and the back part 3 are brought close together, and for each side of the diaper 1 the lateral tab 8 is gripped and the hooks 9 are applied onto the loops 11 of the strip 10.

According to the principle which is the basis of the invention, a strap and a means of retaining said strap are used for at least partial closure of the diaper. This first example involves closure of the diaper after use and after folding it over itself.

According to this first example, illustrated by Figures 1 and 2, at least one tab 8a (on the left in the figures) includes an elastic strap 13 which extends transversely between two anchoring zones 14. The other fastening tab 8b is adapted with a front end 15 projecting relative to an anterior zone 16 with reduced width. It is this end 15 which acts as a means of retaining the strap 13.

During closure after use of the diaper 1, as illustrated in Figure 2, the user has folded said diaper 1 over itself starting from the front part 2 so that the impermeable sheet 5 remains on the outside. In doing this, both lateral tabs 8a and 8b remained available. It is sufficient for the user to pull one of these two tabs 8a and 8b over towards the other, to grip the elastic strap 13 of the first tab 8a, to stretch it to go over the end 15 projecting from the second tab 8b. The two wings 15a and 15b of the end 15 prevent the elastic strap 13 from returning to its initial position on the first tab 8a. Thus, as illustrated in Figure 2, the closing over itself of diaper 1 is obtained without using adhesive or the actual mechanical fastening parts. In the example illustrated, although it may not be necessary, the two fastening tabs 8a, 8b have strictly the same configuration and both have an elastic strap 13. Therefore, the user may use either of the two straps.

As illustrated in Figure 3 such fastening tabs 8a, 8b can be obtained from a continuous strip 17, having on its external surface two longitudinal zones 18, 19 provided with hooks, said zones being arranged in the immediate vicinity of, and symmetrical relative to, longitudinal axis DD of

the strip 17. The internal surface of the strip 17 is coated with an adhesive along two longitudinal zones near the two opposite edges 20, 21 of the strip 17, this adhesive allowing attachment of the fastening tabs along the edge 12 of the diaper 1.

Two elastic straps 13, supplied continuously, are attached to the external surface of the strip 17 by anchoring zones 14 along two longitudinal lines delimiting the strip 17 into three zones of approximately the same width. The strip 17 so structured is subjected to two types of cuts, one longitudinal and the other transverse.

The longitudinal cut 22 is made in the central zone between the two elastic straps 13. It includes rectilinear portions 23 in the immediate proximity of elastic straps 13, but alternating from one side to the other, and sinusoidal portions 24 connected to the two rectilinear portions 23 which give the configuration illustrated in Figure 4.

The transverse cuts 25 are partial cuts which run from a given edge 20, 21 of the strip to a rectilinear portion 23 of the cut 22 while passing through an anchoring zone 14. The anchoring zone 14 must be sufficiently long that after the transverse cut 25 is made, the elastic strap 13 remains anchored to the two sections separated by said cut 25. The fastening tabs 8a and 8b are thus obtained to be fixed on the sides, on the right and on the left of the back part 3 of the diaper 1, that are terminated by an extension in the shape of a mushroom.

According to a second embodiment variant, also using an elastic strap 26, the two fastening tabs 27a, 27b, have a rectangular shape; the means of retaining the elastic strap 26 carried by the first tab 27a being formed by two slits 28 made obliquely in the second tab 27b, as illustrated in Figure 4. During closure of the diaper 1 after use, and after positioning of the fastening tabs 27a and 27b opposite each other, the user grips the elastic strap 26 carried by the first tab 27a and stretches it to enter the two slits 28 of the second strap 27b.

Figure 5 represents the continuous strip 29 permitting realization of the fastening tabs 27 of the above-mentioned second variant. Here are found, as before, the longitudinal zone 30 provided with hooks and the elastic strap 26 periodically attached to the external surface of the strip 29 along anchoring zones 31, as well as the transverse cuts 32 passing through the anchoring zones 31. The formation of notches 28 is obtained by point cuts 33 in the form of a V, the tip of which is located on each transverse cut 32, and the oblique branches of which extend symmetrically on both sides of this cut 32.

Attachment of the elastic strap on the internal or possibly external surface of the strip, as illustrated in the two examples mentioned above, can be obtained by any adapted means, ultrasound, gluing, stitching. The elastic strap 13, 26 is placed in the approximately unstretched state, or is stretched very little, so as to allow it the desired elasticity to achieve connection of the two tabs as explained above.

In the above-mentioned example, the strap and its associated retaining means are designed to close the disposable diaper folded over itself after use. In the example that will be described below and that is illustrated in Figures 6 to 11, the strap and its associated retaining means are designed for at least partial closure of the disposable diaper around the waist of the baby.

In other words, the strap and its associated retaining means are substituted for the usual closure system using either an adhesive or mechanical fastening parts of the self-adhesive type.

According to the second example, the disposable diaper 34 that is illustrated in Figure 6 has the general shape of the disposable diaper 1 in Figure 1, but it includes along the two edges 35 of its back part 36 two lateral tabs 37, each provided with an elastic strap 38 suitable for interacting with a retaining means 39 attached to the external sheet 40 of the front part 41 of the diaper 34.

In the variant illustrated in Figure 6, the retaining means is a semi-rigid piece 39 which has a configuration identical to that of the fastening tabs 8 of the diaper 1 illustrated in Figure 1, but is free of elements of the self-adhesive type and of the elastic strap. This piece 39 may be made from a single strip, with a longitudinal cut and partial transverse cuts as illustrated in Figure 3. This piece 39 is attached to the external sheet 40 of the front part 41 of the diaper 34 by a first end 39a. Its other end 39b projects relative to an anterior zone 42 with reduced width. This mushroom-shaped end 39b acts as the means of retaining the strap 38.

The fastening tab 37 is attached by an adhesive zone 37a along an edge 35 of the back part 36 of the diaper 34. The front end 37b of the fastening tab 37 includes an approximately semi-circular concave recess 43 over which the strap 38 extends transversely and diametrically.

For partial closure, along one side, of the diaper 34 around the waist of the baby, the user applies the front part 41 of the diaper 34 around said waist, pulls the back part 36 over so that it is laterally above said front part 40, and then grips the elastic strap 38 for each fastening tab 37 and makes it go over the end 39b projecting from the retaining piece 39. The two wings 39c, 39d of this end 39b prevent the elastic strap 38 from returning to its initial position.

As illustrated in Figures 7 to 10, the fastening tabs 37 can be obtained from a continuous strip 44 in which one of the surfaces (visible in Figure 7) includes an adhesive coating sensitive to pressure. This strip has a succession of cutouts 45, circular for example, which are regularly arranged on said strip 44. The example illustrated in Figure 7 involves circular cutouts with a diameter h, the centers of which are aligned along a longitudinal axis Δ , said axis being distance d away from a longitudinal edge 46 of the strip 44. The width D of the strip 44 is more than 2 times distance d. The circular cutouts 45 are produced regularly, with a distance H between the centers of two adjacent circles.

While the strip 44 is continuously moved, a strap 48 [sic; 38] is applied on the adhesive surface of said strip 44 along longitudinal axis Δ . The strap 38 is unrolled in an almost unstretched state, or is stretched very little, just sufficiently so that it has a general rectilinear direction as

illustrated in Figure 8. During movement of the strip 44, partial folding of said strip 44 is made along longitudinal axis Δ , the zone 47 between the longitudinal edge 46 and the strap 38 being folded back over said strap 38 and applied against the adhesive surface of the strip 44. As illustrated in Figure 9, a succession of semi-circular concave recesses 43 is obtained on one side, between which the strap 38 extends diametrically, and an adhesive longitudinal portion 48 is obtained on the other side.

To obtain a fastening tab 37, it is sufficient to make, according to spacing H , a succession of transverse cuts 49, each cut being made equidistant between two semi-circular concave recesses 43. The adhesive longitudinal part 48 enables attachment of the tab 37 along the edge 35 of the back part 36 of the diaper 34.

The circular shape of the cutouts 45 is not exclusive. The goal of the recess is to allow easy gripping of the elastic strap 38 while handling it without specific operation of the anchoring zones 50_a, 50_b of said strap 38, due to the adhesive that coats one surface of the strip 44. In particular, value may be found in making cuts that are not perfectly symmetrical so as to make a small adhesive portion in the immediate vicinity of the recess 43, which will permit obtaining a temporary attachment of the fastening tab 37 when it is folded on the internal permeable sheet of the diaper 34 during manufacture. In the example illustrated in Figure 7, it will be sufficient to do this so that in the zone 47 the cutout 45 is not a semi-circle but a rectangle with large side h and small side $h/2$.

In the variant illustrated in Figure 6, there are two retaining pieces 39, each piece being suitable to interact with the elastic strap 38 of a fastening tab 37. However, it may be advantageous to arrange on the external sheet 40 of the front part 41 of the diaper 34 a single frontal strip attached centrally to said external sheet 40, where the two unattached free ends form the retaining means for the two straps 38. This frontal strip 51, as illustrated in Figure 11, may be attached in a single operation during the manufacture of the disposable diaper 34. In the variant illustrated in Figure 11, the frontal strip 51 has projecting free ends 52, not attached to the sheet 40, which differ in their configuration from the projecting ends 39_b of the example illustrated in Figure 6. Overall, the end 52 has a mushroom shape, but the zone of smaller width has two recesses 54, each forming an angle α on the order of 90° and penetrating into the projecting end 52. The goal of this specific configuration is to improve the hooking between the elastic strap 38 and the retaining means, and especially to prevent the strap from being unhooked from the projecting end 52 during movements of the baby or from inopportune handling by the user, the internal edges 55 of the projecting end 52 being inclined so as to lead the elastic strap 38 back towards the interior of the zone 53 with reduced width in case of possible displacement of said strap.

In the examples that have just been described, an elastic strap is used, which in particular offers the great advantage of obtaining permanent tightening of the disposable diaper around the

waist of the user. The invention is not linked to this embodiment, however. Other types of non-elastic straps may be used with possibly the same retaining means described above, or even with other retaining means.

Concerning a non-elastic strap, there will normally be only a single anchoring point for one of its ends at the lateral edge of the back part of the diaper, the other free end being locked at the retaining means. For example, the other end may include an overthickness, especially a knot or double knot, which acts as locking means interacting with the retaining means, the latter having, for example, one or more slits for passage of the strap, the overthickness being prevented from sliding through the slit(s).

Approximately the same retaining means could be used as those described in the examples of Figures 1, 6 and 11 in using a non-elastic strap, attached to the back part by a single anchoring point, possibly supported by a lateral fastening tab, said strap having along its length successive hook-type self-adhesive parts and loop-type self-adhesive parts. These parts are distributed on the strap such that it is possible to encircle the projecting end of the retaining means at the anterior zone of less width, and to lock the strap at this zone as a result of the interaction of the loop parts and hook parts.

In the first example, the strap and its associated retaining means was designed for closure of the diaper folded over itself after use; in the second example, the two straps and their associated retaining means were designed for closure of the diaper around the waist of the baby. Of course, it is possible to use, within the scope of the present invention, one or more straps and its(ther) associated retaining means which, at the same time, ensure closure of the diaper around the waist of the baby and closure of the diaper once folded over itself after use. In particular, with regard to the second example illustrated in Figure 6, it is sufficient for one of the two fastening tabs 37 to be provided with two slits made obliquely along its two opposite sides, following the example of slits 28 of tabs 27a and 27b illustrated in Figure 4. These two slits are suitable for acting as retaining means for the strap of the other fastening tab during closure of the diaper folded over itself after use, for disposal.

Moreover, in the entire description that has just been made, the strap is supported by a lateral fastening tab which is itself attached along one of the lateral edges of the back part of the diaper. The invention is of course not limited to this embodiment. The strap could be supported by a tab attached to the front part of the diaper or even anchored directly on the external sheet of the front part of the diaper. Of course, this change in location of the strap will also cause change in the location of the associated retaining means for said strap, so as to affect at least partial closure of the diaper during interaction of these two parts.

Claims

1. Disposable diaper characterized in that, for closure of the disposable diaper either around the waist of the user or after use after folding the diaper over itself, it comprises at least one strap (13,38) integral with a first zone of the diaper and at least a means (15,39) of retaining said strap integral with a second zone of the diaper, the respective placement of the first and second zones being determined to obtain at least partial closure of the diaper (1,34) when the strap (13,38) interacts with the corresponding retaining means (15,39).

2. Disposable diaper (34) according to Claim 1 equipped with a fastening system for closure of the diaper around the waist of the user, characterized in that said fastening system includes two straps (38), each ensuring closure of one side of the diaper.

3. Disposable diaper according to Claim 2 characterized in that the two straps (38) are attached, preferably by means of two lateral tabs (37), to the two lateral edges (35) of the back part (36) of the diaper (34), while the retaining means (39) suitable for interacting with said two straps (38) are frontally arranged on the front part (41) of said diaper (34).

4. Disposable diaper according to Claim 3 characterized in that it includes a frontal strip (51) which is attached, in particular by gluing, only along its central portion to the front part (41) of the diaper (34), and the retaining means are formed by the two free ends (52) of said strip (51) that are not attached to said front part.

5. Disposable diaper according to any of Claims 1 to 4 characterized in that each retaining means is a section (39) of semi-rigid strip integral with the external sheet (40) of the diaper, said section (39) including at least one and preferably two transverse notches (42) into which the strap (38) goes to obtain at least partial closure of the diaper (34).

6. Disposable diaper according to Claim 5 characterized in that the section includes two notches consisting of two recesses (52) [sic] made transversely and delimiting a wrapping head (39b) of the strap, with two projecting transverse portions (39c, 39d).

7. Disposable diaper according to any of Claims 1 to 6, characterized in that the strap (13, 38) is elastic with two anchoring points (14, 50).

8. Disposable diaper according to Claim 7 characterized in that the elastic strap (38) is supported by a lateral tab (37) attached to the first zone of the disposable diaper, both ends of the strap being anchored along the two opposite edges (50a, 50b) of the tab such that said strap in its inactive position has a transverse direction with respect to said tab (37) and is situated near the free end of the latter.

9. Disposable diaper according to Claim 8 characterized in that the end of the lateral tab has a concave cutout (43) between the two anchoring parts (50a, 50b) of the strap (38).

10. Method of manufacturing a lateral tab (37) designed to equip a disposable diaper (34) according to Claim 9, with width H and having a concave cutout (43), approximately semi-circular, with diameter h , characterized in that it consists of:

- a) continuously unrolling a tape (44) with width D , made adhesive on a first surface and presenting a succession of approximately circular cutouts (45) aligned along a longitudinal axis Δ of the tape (44) located at a distance d from the first longitudinal edge (46) of the tape (44),
- b) applying an elastic strap (38) continuously on the first adhesive surface of the tape (44), aligned with the longitudinal axis Δ
- c) folding the tape (44) along the longitudinal axis Δ while folding down the portion of the tape (47) arranged along the first longitudinal edge (46) onto the adhesive surface,
- d) sectioning the tape by successive transverse cuts (49) according to a spacing H , each transverse cut (49) being made approximately medially between two approximately circular cutouts (45) of the tape (44).

11. Procedure according to Claim 10 characterized in that the width D of the tape is more than 2 times d so that after folding, an adhesive lateral portion (48) remains that after sectioning forms an attachment zone for the fastening tab (37) on the lateral back edge of the disposable diaper (34).

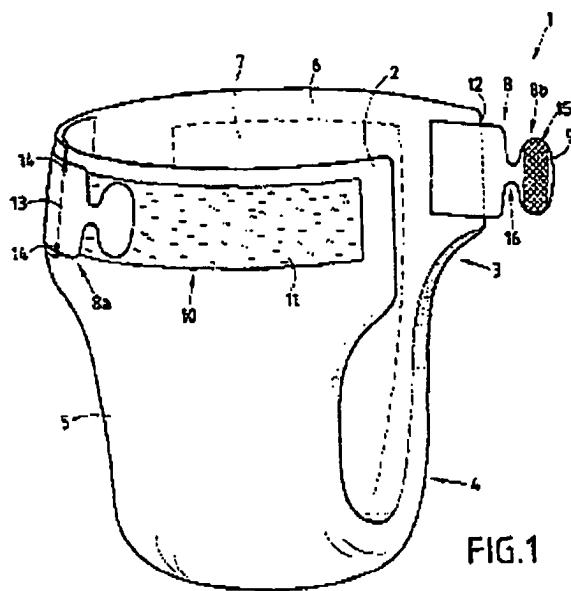


FIG.1

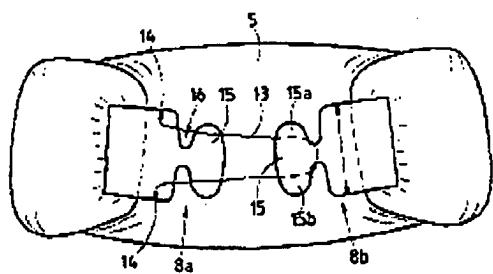


FIG.2

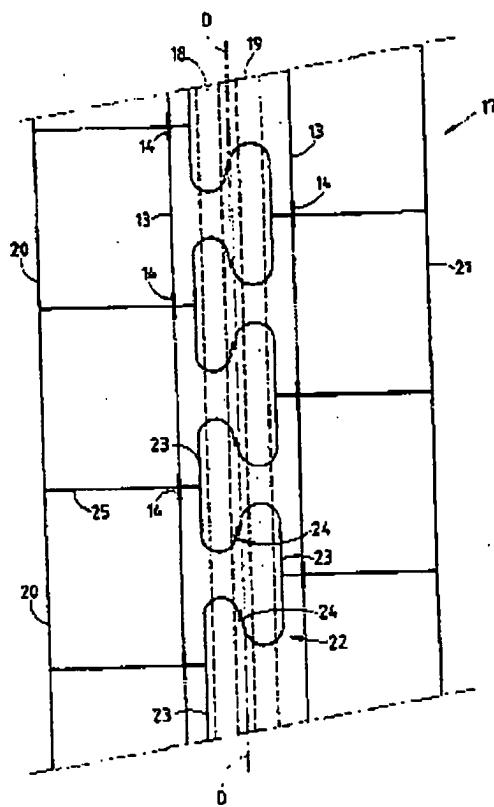


FIG.3

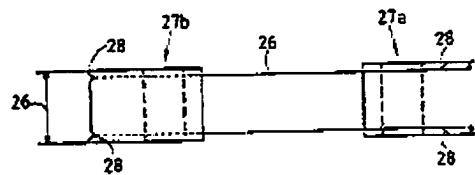


FIG.4

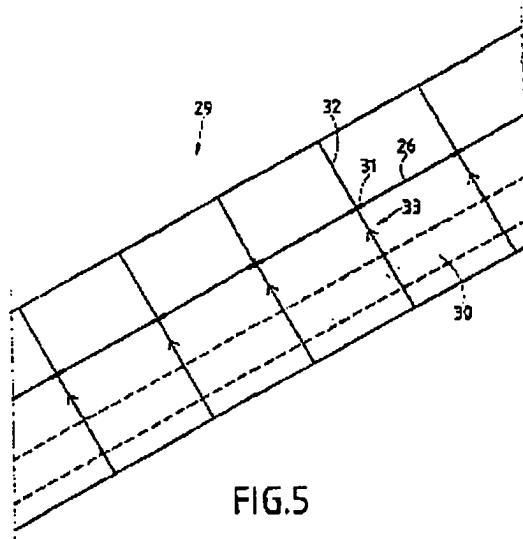


FIG.5

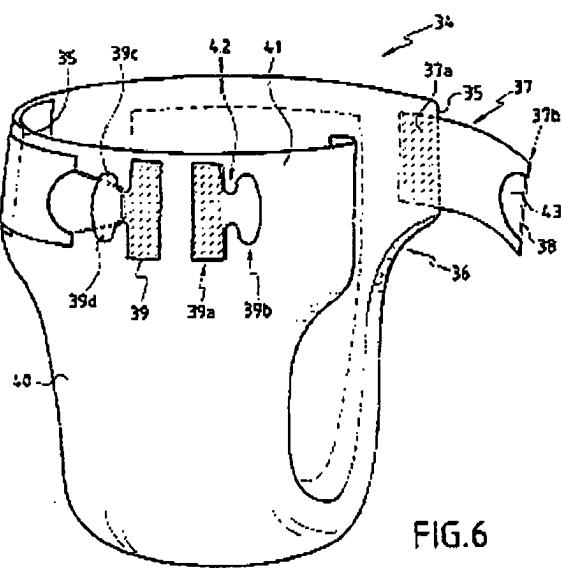


FIG.6

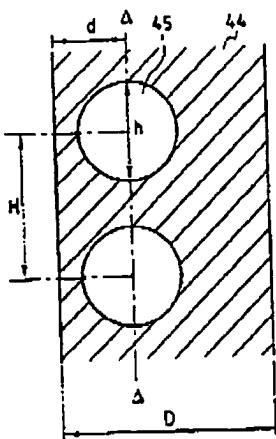


FIG.7

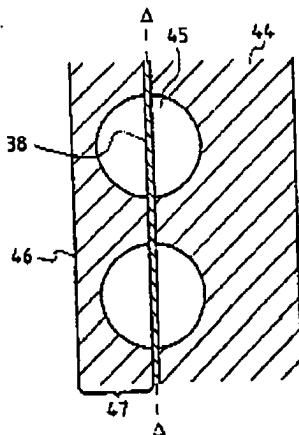


FIG.8

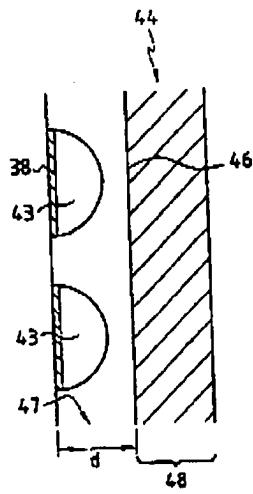


FIG.9

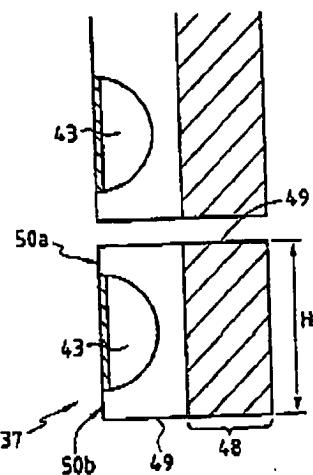


FIG.10

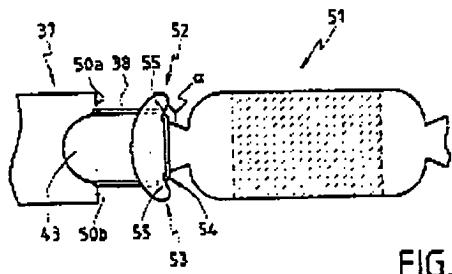


FIG.11

FRENCH REPUBLIC
National Institute
of Industrial Property

Application Number
FA 588889
FR 0007913

PARTIAL PRELIMINARY SEARCH REPORT

established on the basis of the most recent claims
filed before the start of the search
see Supplementary Pages

| DOCUMENTS CONSIDERED TO BE RELEVANT | | Claims concerned | Class attributed to the invention by INPI | | |
|--|--|------------------|---|--|--|
| Category | Citation of document with indication where appropriate, of relevant passages | | | | |
| X | US 5 409 476 A (COATES FREDRICA) April 25, 1995 * column 8, line 53 – column 9, line 7 * * figures 14, 14A, 14B * | 1, 2, 7, 8 | A61F13/56 | | |
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| A | * column 4, line 36 – column 5, line 29 * * column 5, line 51 – column 10, line 36 * * figures 1A-9 * | 10 | | | |
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| Category | Citation of document with indication where appropriate, of relevant passages | | | | |
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